

D-20743-1

In the claims:

Please add new claims 22-24:

22. The process of claim 1, wherein R is a member of group (i), and said secondary metal ions are selected from the group consisting of:  $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Rb}^+$ ,  $\text{Cs}^+$ ,  $\text{Be}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{B}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Ga}^{3+}$ ,  $\text{In}^{3+}$ ,  $\text{Tl}^{3+}$ ,  $\text{Sn}^{2+}$ ,  $\text{Sn}^{4+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Sb}^{4+}$ ,  $\text{Sc}^{3+}$ ,  $\text{Ti}^{3+}$ ,  $\text{V}^{3+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Y}^{3+}$ ,  $\text{Zr}^{n+}$ ,  $\text{Nb}^{n+}$ ,  $\text{Mo}^{n+}$ ,  $\text{Tc}^{n+}$ ,  $\text{Ru}^{3+}$ ,  $\text{Rh}^{n+}$ ,  $\text{Pd}^{2+}$ ,  $\text{Ag}^+$ ,  $\text{Cd}^{2+}$ , lanthanides,  $\text{Pt}^{2+}$ ,  $\text{Au}^{3+}$  and  $\text{Hg}^{2+}$ .

23. The process of claim 22, wherein R is a member of group (i), and said secondary donors are selected from the group consisting of: O, N, S, Cl, F, Br, I, C, and P.

24. The process of claim 12, said secondary metal ion is selected from the group consisting of:  $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Rb}^+$ ,  $\text{Cs}^+$ ,  $\text{Be}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{B}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Ga}^{3+}$ ,  $\text{In}^{3+}$ ,  $\text{Tl}^{3+}$ ,  $\text{Sn}^{2+}$ ,  $\text{Sn}^{4+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Sb}^{4+}$ ,  $\text{Sc}^{3+}$ ,  $\text{Ti}^{3+}$ ,  $\text{V}^{3+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Y}^{3+}$ ,  $\text{Zr}^{n+}$ ,  $\text{Nb}^{n+}$ ,  $\text{Mo}^{n+}$ ,  $\text{Tc}^{n+}$ ,  $\text{Ru}^{3+}$ ,  $\text{Rh}^{n+}$ ,  $\text{Pd}^{2+}$ ,  $\text{Ag}^+$ ,  $\text{Cd}^{2+}$ , lanthanides,  $\text{Pt}^{2+}$ ,  $\text{Au}^{3+}$  and  $\text{Hg}^{2+}$ .

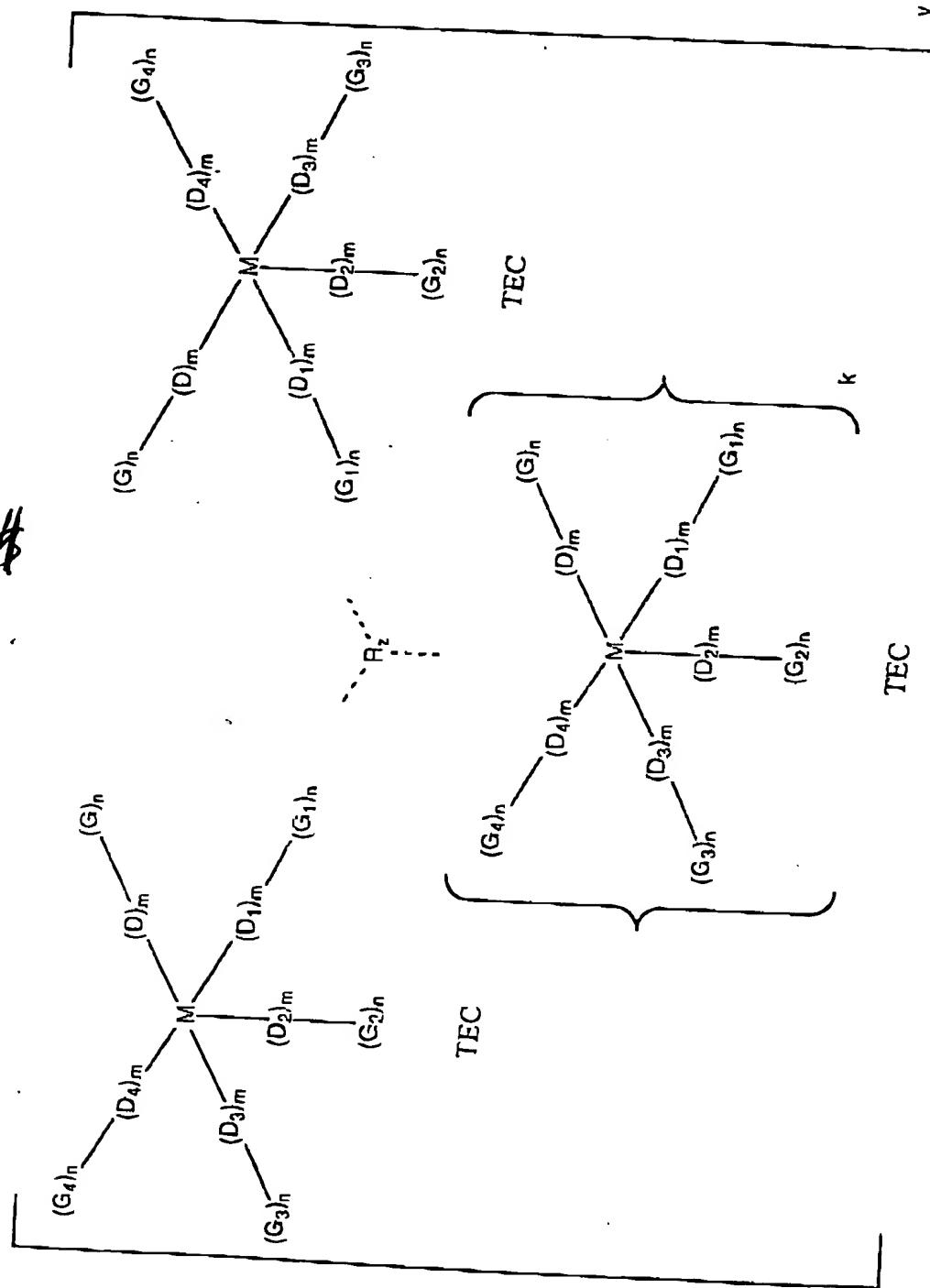
25. The process of claim 24, said secondary donor is selected from the group consisting of: O, N, S, Cl, F, Br, I, C, and P.

26. The process of claim 13, wherein R is a member of group (i), and said secondary metal ions are selected from the group consisting of:  $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Rb}^+$ ,  $\text{Cs}^+$ ,  $\text{Be}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{B}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Al}^{3+}$ ,  $\text{Ga}^{3+}$ ,  $\text{In}^{3+}$ ,  $\text{Tl}^{3+}$ ,  $\text{Sn}^{2+}$ ,  $\text{Sn}^{4+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Sb}^{4+}$ ,  $\text{Sc}^{3+}$ ,  $\text{Ti}^{3+}$ ,  $\text{V}^{3+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Fe}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Y}^{3+}$ ,  $\text{Zr}^{n+}$ ,  $\text{Nb}^{n+}$ ,  $\text{Mo}^{n+}$ ,  $\text{Tc}^{n+}$ ,  $\text{Ru}^{3+}$ ,  $\text{Rh}^{n+}$ ,  $\text{Pd}^{2+}$ ,  $\text{Ag}^+$ ,  $\text{Cd}^{2+}$ , lanthanides,  $\text{Pt}^{2+}$ ,  $\text{Au}^{3+}$  and  $\text{Hg}^{2+}$ .

27. The process of claim 26, wherein R is a member of group (i), and said secondary donors are selected from the group consisting of: O, N, S, Cl, F, Br, I, C, and P.

Please amend claims 1, 8, 12, 13, 16 and 21 as follows:

1. (Once Amended) A process for selectively adsorbing a component of a gas mixture, which comprises contacting the mixture with a solid state, selective adsorbent material comprising a porous framework of a plurality of transition element complexes (TECs) having the formula shown below:



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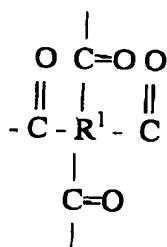
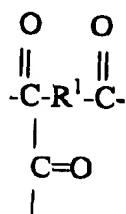
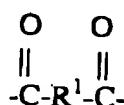
wherein:

- (a) M is a primary transition metal ion;
- (b) D to D<sub>4</sub> are primary donors and m is zero or one, at least three of D to D<sub>4</sub> occupying primary donor coordination sites on M but leaving at least one open coordination site on M for the component to react with M;
- (c) G to G<sub>4</sub> are functional groups and n is zero or one, at least one of G to G<sub>4</sub> being intramolecularly bonded to at least three adjacent primary donors to form at least one 5 or 6 member chelate ring on the primary transition metal ion and providing at least three donors thereto;
- (d) M, D to D<sub>4</sub> and G to G<sub>4</sub> together define one or more transition metal complexes, wherein said complexes are the same or different and wherein k is from 0 to 4;
- (e) R is an intermolecular connecting group selected from
  - (i) secondary metal ions coordinated with secondary donors bonded to one or more of groups G to G<sub>4</sub> on the respective TECs;
  - (ii) multifunctional organic groups forming covalent bonds with one or more of groups G to G<sub>4</sub> on the respective TECs;  
or
  - (iii) non-coordinating counter-ions spaced between and separating the respective TECs;
- (f) y is an integer sufficient to provide said porous framework of the plurality of TECs for the selective adsorption of the desired component thereon.

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8. (Once amended) The process of claim 1 for selectively adsorbing a component of a gas mixture, wherein R is a member of group (ii) and has the formula

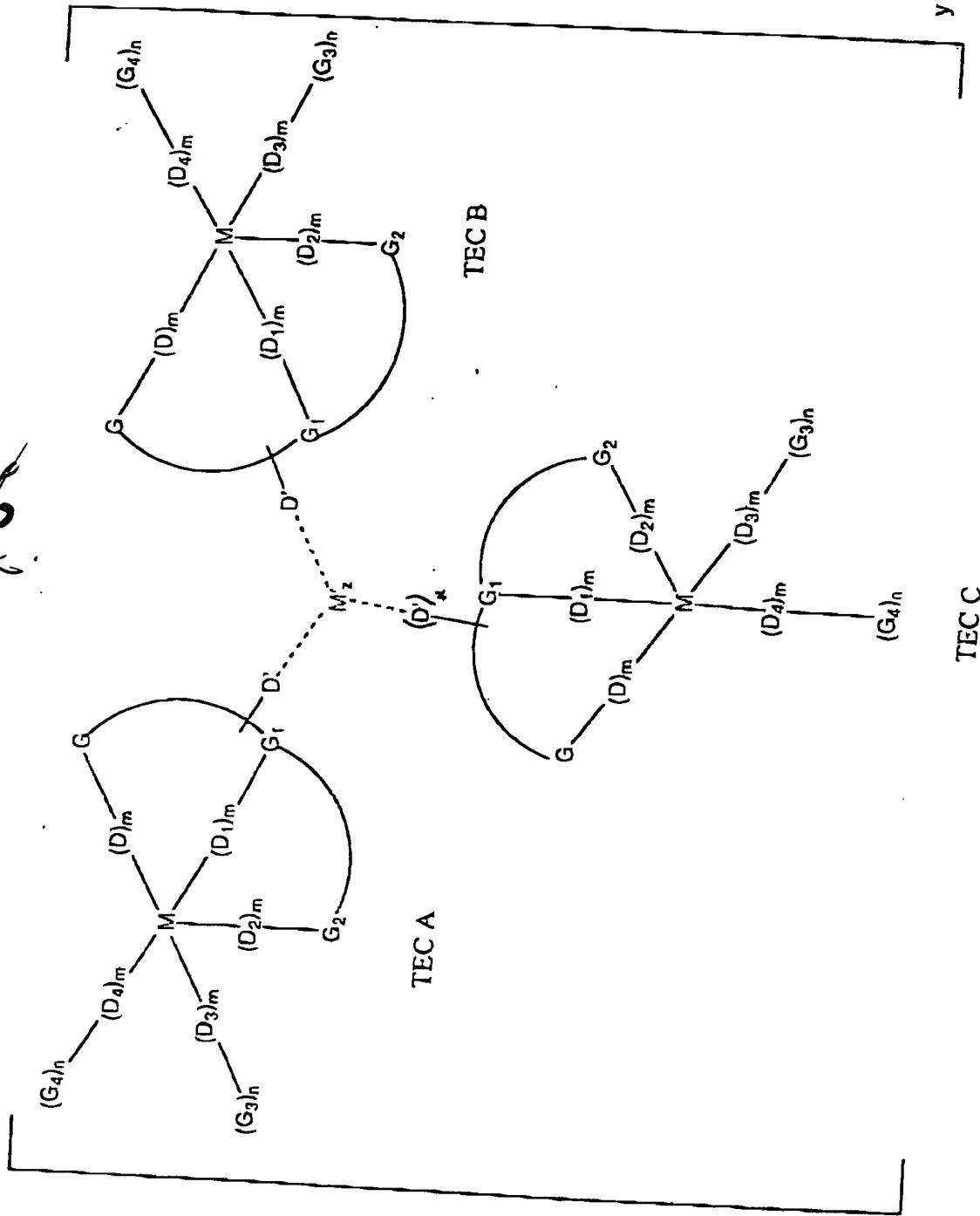


or mixtures thereof, and wherein R<sup>1</sup> is a substituted or unsubstituted acyclic or carbocyclic group and is unsubstituted or is substituted by F, Cl, Br, O, N, P, S, Si or B.

12. (Once amended) A process for selectively adsorbing oxygen from a gas mixture, which comprises contacting the mixture with a solid state, selective adsorbent material comprising a porous framework of a plurality of transition element complexes (TECs) having the formula shown below,

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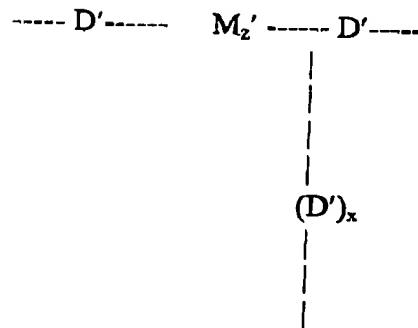
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wherein:

- (a) M is a primary transition metal ion selected from Co(II), Fe(II) or Mn(II);
- (b) D to D<sub>4</sub> are primary donors occupying primary donor coordination sites on M but leaving one open coordination site on M for an oxygen molecule to react with M;
- (c) G to G<sub>4</sub> are functional groups and n is zero or one, at least one of G to G<sub>4</sub> being intramolecularly bonded to at least three adjacent primary donors to form at least one 5 or 6 member chelate ring on the primary transition metal ion and providing at least three donors thereto;
- (d) M, D to D<sub>4</sub> and G to G<sub>4</sub> together define one or more transition metal complexes TEC A, TEC B and TEC C, wherein said complexes are the same or different;
- (e) D' is a secondary donor or a group of secondary donors bonded to a chelate ring on a coordination site on M; ;
- (f) M' is a secondary metal ion coordinated with secondary donors D',



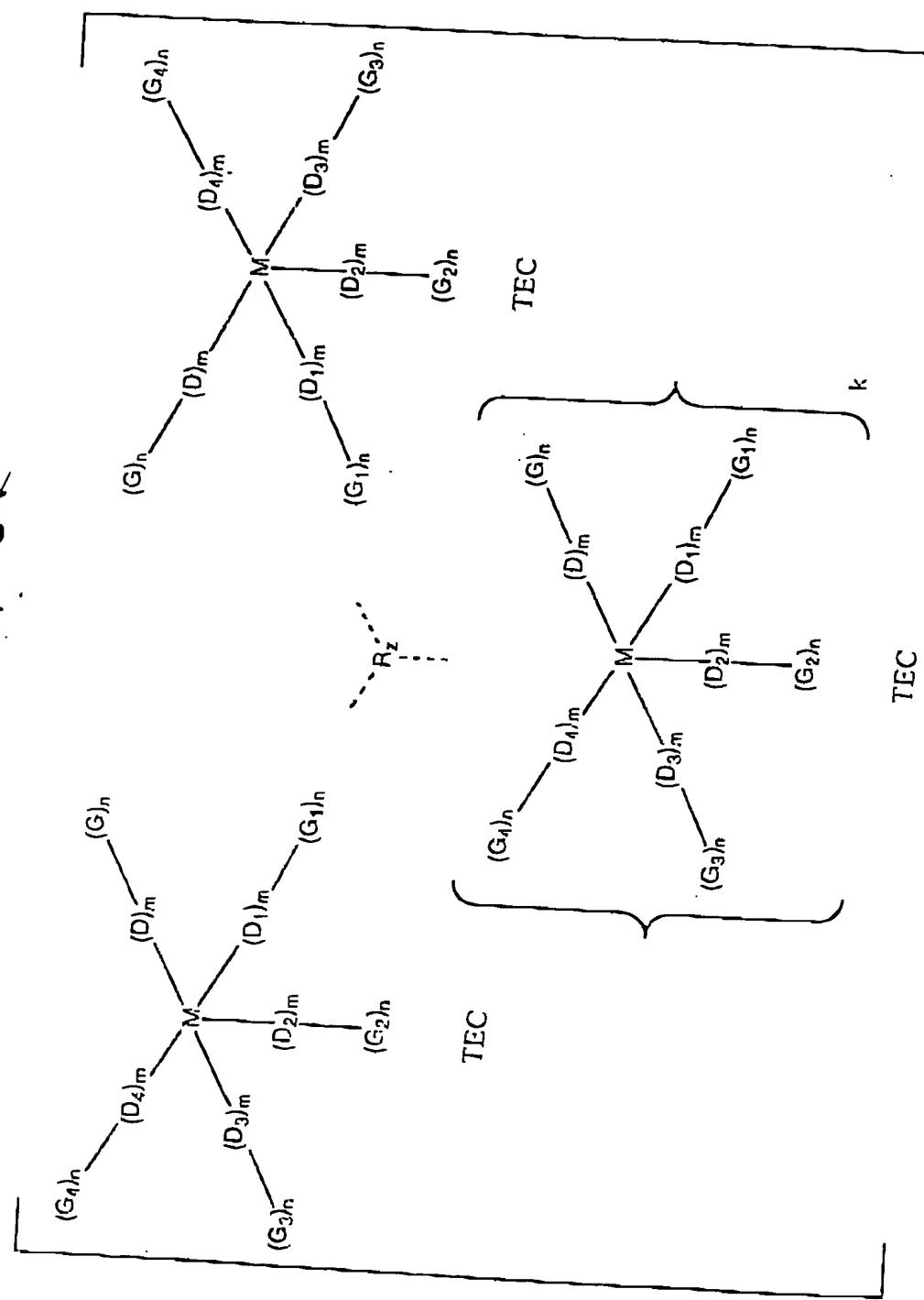
the group bonding the respective TECs to one another to maintain them in a porous framework and wherein z is from 1 to 8 and x is from 0 to 6; and

- (g) y is an integer sufficient to provide said porous framework of the plurality of TECs for the selective adsorption of oxygen thereon.

13. (Once amended) A composition for selectively adsorbing a component of a gas mixture, which comprises a solid state, selective adsorbent material comprising a porous framework of a plurality of transition element complexes (TECs) having the formula shown below,

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cont.



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wherein:

*A6*

- (a) M is a primary transition metal ion;
- (b) D to D<sub>4</sub> are primary donors and m is zero or one, at least three of D to D<sub>4</sub> occupying primary donor coordination sites on M but leaving at least one open coordination site on M for the component to react with M;
- (c) G to G<sub>4</sub> are functional groups and n is zero or one, at least one of G to G<sub>4</sub> being intramolecularly bonded to at least three adjacent primary donors to form at least one 5 or 6 member chelate ring on the primary transition metal ion and providing at least three donors thereto;
- (d) M, D to D<sub>4</sub> and G to G<sub>4</sub> together define one or more transition metal complexes, wherein said complexes are the same or different and k is from 0 to 4;
- (e) R is an intermolecular connecting group selected from
  - (i) secondary metal ions coordinated with secondary donors bonded to one or more of groups G to G<sub>4</sub> on the respective TECs;
  - (ii) multifunctional organic groups forming covalent bonds with one or more of groups G to G<sub>4</sub> on the respective TECs;
  - (or)
  - (iii) non-coordinating counter-ions spaced between and separating the respective TECs;

wherein z is from 1 to 8, and wherein R may be the same or different when z is greater than 1; and

(f) y is an integer sufficient to provide said porous framework of the plurality of TECs for the selective adsorption of the desired component thereon.

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16. (Once amended) The composition of claim 13 for selectively adsorbing a component of a gas mixture, wherein R is a member of group (ii) and has the formula

